

## TECHNOLOGY FEATURE

### Solar Cars Go 1,200 Miles without Fuel

Imagine traveling 1,230 miles (1,980 km) without a single drop of fuel. That's the feat about 1,000 college students achieved as they competed in **Sunrayce 97**, using only sunlight for power. A biennial, long-distance competition for solar-powered cars, Sunrayce 97 was cosponsored by the U.S. Department of Energy (DOE), Electronic Data Systems Corp. (EDS), and General Motors Corp. (GM). The competition began on June 19 with 36 solar vehicles at the legendary Indianapolis Motor Speedway in Indiana. All but one vehicle successfully crossed the finish line on June 28 in Colorado Springs, Colorado. The team that finished with the lowest cumulative time won.

California State University-Los Angeles (Cal State-LA) placed first, with a record-setting pace averaging 43.29 mph over the entire distance. Cal State-LA had a total elapsed time of 28:41:24 hours. Massachusetts Institute of

Technology was a close second with a total time of 29:00:20 hours, followed by Stanford University/University of California-Berkeley at 29:33:15 hours.

"This was our third race, and we were more prepared for this one than the two before," asserts Dr. Dick Roberto, Cal State-LA Faculty Advisor. "We crossed all the t's and dotted all the i's more than once and were ready for any contingency. In the end, it was our readiness and our vehicle's reliability that acted as the deciding factors in winning this race."



*Iowa State University's PRISUm ExCytar crosses the finish line accompanied by the team.*

Sunrayce teams were typically composed of students from many areas of expertise—design; materials; electrical, mechanical, and computer engineering; business; and marketing. Taking a concurrent engineering approach, each team split into separate groups to simultaneously attack a multitude of design challenges. Some vehicle components were manufactured and donated by outside companies, but many were made by the students themselves. Some companies, such as EDS, provided advanced computer modeling expertise and equipment to enable the Sunrayce teams to study the aerodynamic characteristics of their vehicles.

The solar-powered vehicles in Sunrayce 97 used photovoltaics

**"Winning Sunrayce was the best gift the team gave to ourselves and to the university....the hard work in class and the lab paid off."**

*Roman Vasquez, Cal State-LA Team Captain/Driver*

(or solar cells) to capture sunlight and transform it into usable, non-polluting electricity. Enough energy can be collected in this manner to power a 2- to 10-horsepower electric motor (2 hp is equivalent to the power of a 1,500-watt hair dryer). Teams also had to consider weight, rolling resistance, and aerodynamic shape as they designed their cars. The resulting futuristic profiles often looked more like aircraft than automobiles.

If interested in sponsoring or participating in Sunrayce 99, contact Bryan Arnold, Sunrayce Headquarters Coordinator (phone: 800/606-8881; fax: 248/620-1547; e-mail: headqtr@sunrayce.gmr.com).

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## FUTUREDRIVE

Volume 3, Number 2, Summer/Fall 1997

## Purpose

To inform past, present, and potential sponsors, participants, organizers, volunteers, and others interested in DOE-sponsored vehicle competitions about the plans for and results from the competitions.


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## UC-Davis Faculty Advisor Honored at FutureCar Challenge



Joe Bordogna from the National Science Foundation presents award to Dr. Andrew Frank (right).

The faculty advisor's role in advanced vehicle competitions can make the difference between a mediocre team and a winning team. The advisors spend hundreds of hours in the automotive shop and lab testing ideas, concepts, and approaches with their students. They often abandon a chance to research and publish. They spend a week or two each year on the road eating fast food and living in economy lodging. For their extraordinary effort, the faculty advisors receive a handshake and a chicken dinner at the end of each competition while organizers pick their brains for ways to improve the competitions.


But this year, at the 1997 FutureCar Challenge, the reward was much more substantive. Thanks to a generous grant from the National Science Foundation, we offered a \$20,000 bonus to the faculty advisor who did the best job of integrating the FutureCar project into his/her engineering curriculum.

Clearly, several faculty members deserve the recognition that such an award brings. However, organizers chose Dr. Andrew Frank from the University of California-Davis (UC-Davis). Dr. Frank has devoted the last 25 years to optimizing vehicle fuel economy, emissions, and performance—precisely the FutureCar Challenge goals. At the same time, he created undergraduate courses to teach innovative automotive design and construction. Students in these classes receive credit for their work on FutureCar. All of the courses teach students to be creative while still relying on sound engineering principles. It is obvious when seeing and driving the UC-Davis FutureCar that this concept works. Only by applying innovative concepts to the powertrain configuration, the powertrain control concept, and the body design, and by using new materials, could the team get 63 mpg (federal highway test cycle) from a vehicle that originated as a Ford Taurus.

Although competition performance goes a long way to validate the teaching approach, the students are the real judges. Listen to what Dr. Frank's students have to say about his role as teacher and faculty advisor:

"Dr. Frank is an exceptionally rare professor who treats his students as peers. He has welcomed us into his project, his knowledge, and his home as friends." ♦ "Dr. Frank taught me not to underestimate the importance of thinking three times, measuring twice, and doing once." ♦ "He has made a huge impact on my life, both professionally and personally." ♦ "I have yet to meet another professor who provides the balance of theory and application that Dr. Frank does." ♦ "Dr. Frank is sometimes forceful, sometimes passive, but he always allows us to make the final decision and our own mistakes and victories." ♦ "Dr. Frank has been an inspiration from his hybrid work dating back 20 years. His experience in efficiency is unmatched. I learn more from him every month than I could in all my classes combined."

I couldn't have said it better. Congratulations, Dr. Frank!

  
Shelley Launey  
Manager of Vehicle Competitions  
DOE Office of Transportation Technologies

## EPA Meets FutureCar "Test" Challenge

**T**welve student teams at the 1997 FutureCar Challenge used advanced automotive technologies to convert either Ford Tauruses, Chevrolet Luminas, or Dodge Intrepids, while striving to triple the vehicle's fuel efficiency without sacrificing performance or boosting emissions. The converted vehicles also had to be safe and affordable.

The June 3–11 competition opened with events at the General Motors Technical Center in Warren, Michigan, and ended with a two-day, over-the-road endurance run from Detroit to Washington, DC. (See results on p. 7.) The FutureCar Challenge is sponsored by the U.S. Department of Energy (DOE), with help from the United States Council for Automotive Research (USCAR) and the National Science Foundation. USCAR is an umbrella organization created by Chrysler, Ford and General Motors to do pre-competitive research in a variety of advanced automotive technologies.

During the competition, FutureCars were tested for emissions, handling, consumer acceptability, and use of advanced technologies and materials. The U.S. Environmental Protection Agency's (EPA's) National Vehicle and Fuels Emission Laboratory (NVFEL) conducted the emissions testing. In the past, the Lab has supported other student

vehicle competitions such as the Methanol Vehicle Challenge and the Natural Gas Vehicle Challenge.

At the outset, the FutureCar Challenge presented EPA with some unique challenges:

- ♦ The FutureCar hybrid-electric vehicles required city and highway tests at both high and low states of charge and zero emission vehicle mode—two to three times the number of tests needed for standard vehicles.
- ♦ The vehicles burned many types of fuel, including diesel, bio-diesel, liquid propane gas (LPG), compressed natural gas (CNG), reformulated gasoline (RFG), and ethanol (E85). The diverse fuels required three different test cells, a filter balance room, and chemistry lab support.
- ♦ The tight schedule of events gave EPA only two days to complete all of the tests and deliver processed results.

"We were beginning to think this would be the *EPA Challenge* as well as the *FutureCar Challenge*," jokes David Van Amburg, EPA Mechanical Engineering Technician.

To meet the equipment demands of the competition, EPA provided the following:

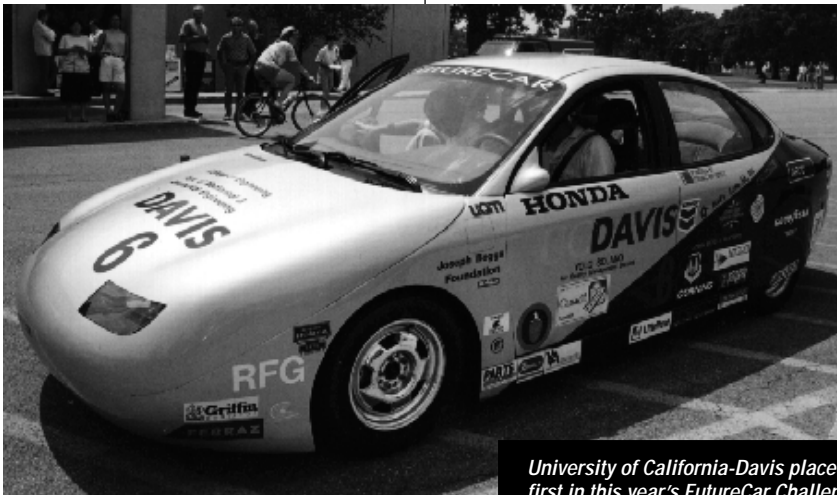
- ♦ A diesel test cell with particulate sampling, rebuilt specifically for the competition;
- ♦ An impinger bench sampling system for collecting "wet samples" and "cartridge samples" from the ethanol-fueled car;
- ♦ A test cell and soak area with proper gas detection safety equipment for gaseous-fueled (LPG and CNG) vehicles;
- ♦ Battery recharging area with safety equipment; and
- ♦ Stand-alone test processing to provide immediate test results. This processing program was designed specifically to meet the testing needs of the FutureCar Challenge and required many development hours from EPA's computer support staff.

Furthermore, to ensure safety, EPA conducted specialized training for its technical staff: safety training for gaseous-fueled vehicles, familiarization training on the rebuilt diesel cell, and cross-training of key technicians for smooth test flow.

Despite the considerable challenges, EPA's entire vehicle testing group—plus computer and maintenance staff and volunteers from other groups—successfully completed the two-day test plan. NVFEL committed 1,200 person-hours to prepare and perform the vehicle testing for the 1996 competition alone and devoted about another 600 person-hours to the 1997 event.

The FutureCar Challenge provided EPA with a hands-on opportunity for learning how to test hybrid-electric vehicles, while also teaching the students who participated how to design an advanced alternative-fuel vehicle.

David Van Amburg  
Mechanical Engineering Technician  
U.S. Environmental Protection Agency



University of California-Davis placed first in this year's FutureCar Challenge.



## Texas Tech Shows Formula-One Teamwork

It took some wee-hours convincing, but two-thirds of the way through the 1997 Propane Vehicle Challenge (held May 14–19 in Texas), 11 desperate senior design engineering students from Texas Tech University got the go-ahead from event officials to replace their burned-out engine. The team's converted Chrysler minivan missed an entire competitive event while students spent five intense hours on a Sunday morning painstakingly removing one engine and hooking up the other. That makes Texas Tech's second-place overall finish pretty remarkable. (See p. 6.)

It all started when two team members failed to show up for a mid-Challenge picnic hosted by Texas A&M Saturday night. Texas Tech team advisors Tim Maxwell and Jessie Jones became concerned when 11 p.m. came and went. Turns out the two students were still at the track where drivers for the 17 participating schools had spent the evening driving down to an empty fuel tank in preparation for the next morning's fuel economy run. The engine that Texas Tech had worked on all year had overheated during the exercise, seemingly eliminating their vehicle from the competition.

"Our students were shattered. I'd never seen such long faces," Maxwell recalls.

Then Aaron Ramos, a senior in Mechanical Engineering, remembered the extra propane-ready engine he and a teammate had brought along, almost as an afterthought. "My buddy's truck bed was empty. We looked at the extra engine and said we may as well take it." The converted engine was left over from earlier experimentation by the team with liquid injection technology, an approach they later discarded in favor of a vapor engine. Maxwell admits he gave the students a hard time about dragging along the second engine.



It was a rare combination of determination, organization, and skill that this winning team exhibited.

It was past midnight when the anxious students approached Challenge Director Bob Larsen for permission to swap engines—and to work through the night doing it. Larsen and his steering group had some serious issues to consider, such as safety and equity. All 11 team members and their advisors were crammed into one motel room awaiting the decision and talking strategy when Larsen "entered the lions' den" to tell Texas Tech they could not work through the night for safety reasons. But Challenge organizers were able to accommodate the eager students by opening the test site extra early the next morning.

"We wanted to help them if we possibly could," Larsen says. "We want everyone to succeed—this is meant to be an educational experience."

Aaron Ramos recalls that no one on the team slept that night. They plotted their strategy for the task ahead and were outside the site

gates at 5:30 a.m. the next morning. (A guard finally let them in at 7 a.m.) The team worked together like a choreographer's dream. "It's the best example of teamwork I've ever seen," says Ramos. "Engine compartments are small, and we had 11 people with their hands in there, all with very specific tasks to perform." Team advisor Maxwell was amazed they didn't get in each other's way.

The students finished switching engines in time to catch the tail end of the acceleration competition. Teams have four tries at this event and keep their best score. Texas Tech had time for just one run but still placed second in the event. They went on to score second-highest overall, even though they had missed the entire on-road fuel economy competition.

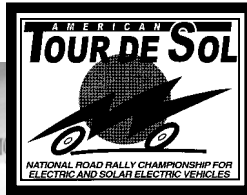
"We were so proud," says Ramos. "We are still in shock, still amazed at what we were able to accomplish."

Team advisor Jessie Jones was so impressed that he gave Ramos and his teammates an "A" in the senior design course—a rare grade for Texas Tech engineering students. But then it was a rare combination of determination, organization, and skill that this winning team exhibited.

For more information about the Texas Tech team and its vehicle design, contact Tim Maxwell or Jessie Jones at (806) 742-3563.

Cathy Kaicher  
Technical Communicator  
Argonne National Laboratory

# Ninth Annual ATdS Showcases Market-Ready EVs



“When we started the NESEA American Tour de Sol nine years ago, we never dreamed that car companies such as Toyota, Ford, and Solectria would be showcasing and marketing electric vehicles,” notes Nancy Hazard of the Northeast Sustainable Energy Association (NESEA), organizer of the event. “Most people don’t realize that electric vehicles are entering the market,” continues Hazard. “General Motors and Solectria have vehicles on the road today, and other major automakers will have product available to fleet buyers within several months.”

The 1997 NESEA Tour vehicles traveled 350 miles from Waterbury, Connecticut, to Portland, Maine, during the week of May 17-24. Participants competed in electric and hybrid-electric vehicles built by students, clubs or individuals, and corporations. Tour title sponsors included the U.S. Department of Energy (DOE) and The Goodyear Tire and Rubber Company.

The Solectria Force set a new event range record of 249 miles for the Production category, using Ovonic nickel metal hydride batteries. The Ovonic battery was developed with support from the U.S. Advanced Battery Consortium and DOE. General Motors plans to use the

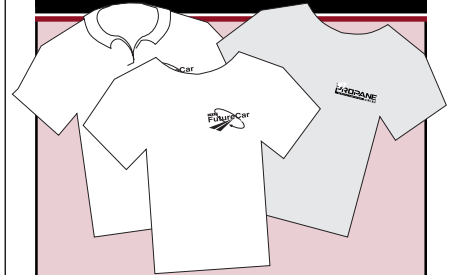
battery in its EV1 electric sports car. A Ford Ecostar, entered by Northeast Utilities, also set a new event range record of 202 miles for a production utility vehicle.

Student and individually built vehicles made a strong showing in several vehicle categories. New Hampshire Technical Institute placed first in the commuter category, followed by entries from Connecticut-based Wooster High School and Maine’s Falmouth High School. Chico State captured the best range prize by driving 140 miles on a single charge.

The U.S. DOE Hybrid category (new last year) had seven entries. A number of different fuels were used in the vehicles’ on-board generators. The cars were typically driven over 200 miles before being refueled. Connecticut State University’s Kineticar took first place with a range of 379 miles, followed by Penn State’s Electric Lion and Mount Everett High School’s Project e-.

NESEA is seeking interested sponsors, entrants, and host towns for the tenth annual American Tour de Sol. For more information, contact Nancy Hazard (413/774-6051, ext. 18), or refer to NESEA’s Web site (<http://www.nesea.org>).

## Competition T-Shirts!



If you missed the 1997 FutureCar Challenge or the Propane Vehicle Challenge, you can still be an honorary supporter by purchasing the following items:

**1997 FutureCar Challenge**  
T-Shirt (Sizes L, XL)...\$10 ea  
Polo Shirt (Sizes L, XL)...\$20 ea

**1997 Propane Vehicle Challenge**  
T-Shirt (Sizes M, L, XL)...\$10 ea  
Bike Bottle...\$4 ea

All shirts are 100% cotton. Polo runs large.

### ORDER FORM

ITEM	QTY	SIZE	PRICE
SHIPPING			\$2.00
TOTAL			\$

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Make your check out to: American Society for Engineering Education. Send completed order form and check to: Argonne National Laboratory, 9700 S. Cass Ave., Bldg. 362, Argonne, IL 60439-4815. Attn: C. McGhee.

# '97 Competitions Reap Rewards

The results are in! Once again, participants in this year's advanced transportation technology competitions demonstrated that electric, hybrid-electric, and alternative-fuel vehicles deserve a place in our nation's future. The competitors not only met challenges related to range, performance, efficiency, and fuel economy but also set some new records. They gained technical know-how, experience, and recognition while having fun in the process.

Marita Moniger  
Technical Communicator  
Argonne National Laboratory



EV Grand Prix  
Electric Vehicles  
April 25-27 / Richmond, VA

More than 200 high school students and instructors took part in the Fourth Annual EV Grand Prix held at Richmond International Raceway. Fourteen teams competed in a 35-lap race and six other events.

## Overall

- ♦ 1st Northampton County High School East Team 2 (Conway, NC)
- ♦ 2nd Gloucester High School (Gloucester, VA)
- ♦ 3rd Northampton County High School East Team 1

Chicago Junior Solar Sprint  
Model Solar-Powered Vehicles  
May 10 / Hinsdale, IL

Seventh- and eighth-grade students created model solar-powered vehicles for this seventh annual competition. The May 10 event was sponsored by DOE, Argonne National Laboratory, and Case Corporation and held at Case in Hinsdale, Illinois. The model cars were judged for design before competing in a double-elimination race, with trophies awarded in both



A young American Tour de Sol competitor.

categories. Each school was permitted to enter two vehicles.

## Best Design

- ♦ 1st Chas. J. Sahs School Chicago, IL
- ♦ 2nd Burbank School, Burbank, IL
- ♦ 3rd Eisenhower Jr. High, Darien, IL

## Race

- ♦ 1st St. John's Lutheran School LaGrange, IL
- ♦ 2nd Bryan Jr. High, Elmhurst, IL
- ♦ 3rd Hadley Jr. High, Glen Ellyn, IL

Formula SAE  
Formula-Type Racing Cars  
May 14-18 / Pontiac, MI

Seventy-seven teams of engineering students from the United States, Canada, Puerto Rico, and England competed in the 1997 Formula SAE, sponsored by the Society of Automotive Engineers International and held at the Pontiac Silverdome. Their goal was to design and build a high-performance car limited to a 600-cc engine with throttle restrictions for the nonprofessional autocross racer. Cars were judged on cost, design, acceleration, maneuverability and handling, endurance, and fuel economy.

- ♦ 1st Cornell Univ.
- ♦ 2nd Univ. of Texas at Arlington
- ♦ 3rd Rochester Inst. of Technology

## DOE M85 Awards

- ♦ 1st Cornell Univ.
- ♦ 2nd Univ. of Texas at Arlington
- ♦ 3rd Univ. of Akron

## DOE Outstanding Teamwork Award

- ♦ Georgia Inst. of Technology

Propane Vehicle Challenge  
Propane-Powered Vehicles  
May 14-19 / Austin, TX

More than 300 students from 17 schools in the United States, Canada, and Puerto Rico participated in the second Propane Vehicle Challenge. Each student team converted a gasoline-powered Chrysler minivan or Dodge Dakota pickup truck to dedicated propane. For the first time, an award was given for the best component to the University of Texas at El Paso (UTEP) for the development of fuel-distribution spiders. This is a novel fuel-rail design that ensures equal distribution (temperature and pressure) of liquid-phase LPG to each fuel injector.

## Minivan Division

- ♦ 1st GMI Engineering and Management Inst. (Flint, MI)
- ♦ 2nd Texas Tech Univ.
- ♦ 3rd Univ. of Texas-El Paso

## Pickup Division

- ♦ 1st Univ. of Waterloo (Ontario)
- ♦ 2nd Texas A&M
- ♦ 3rd Univ. of Tennessee

## Best Component Award

- ♦ Univ. of Texas-El Paso

American Tour de Sol  
Electrics and Hybrid-Electrics  
May 17-24 / Waterbury, CT, to Portland, ME

This ninth annual competition, organized by the Northeast Sustainable Energy Association, attracted major car companies, students, and individuals from around the country. Title sponsors for this event were DOE and The Goodyear Tire and Rubber Company. More than 50 prizes were awarded.



## COMPETITION RESULTS

### BEST VEHICLE PRIZES

#### **Production Category**

- ◆ **1st** Solectria Force NiMH (Solectria-Ovonic Battery, Wilmington, MA)
- ◆ **2nd** Ford Ecostar (Northeast Utilities, Hartford, CT)
- ◆ **3rd** Toyota RAV4-EV (Toyota Motor Sales USA, Torrance, CA)

#### **Commuter Category**

- ◆ **1st** Sunico (Solar-Electric Car Team, New Hampshire Technical Inst., Concord, NH)
- ◆ **2nd** Sparky (Wooster's Charge, Wooster High School, Danbury, CT)
- ◆ **3rd** Solar Saurus (Rocky Hill High School Team, Rocky Hill, CT)

#### **Hybrid Category**

- ◆ **Best Hybrid Vehicle** Kineticar (CSERT-NVCTC, Connecticut State Univ./Naugatuck Valley Technical Community College, Waterbury, CT)
- ◆ **Best Sedan** Hopper EV, (NHTI Tom Hopper, New Hampshire Technical Inst., Concord, NH)
- ◆ **Best Utility Vehicle** Kineticar

#### **Hybrid Category**

- ◆ **1st** Kineticar (CSERT-NVCTC, Connecticut State Univ./Naugatuck Valley Technical Community College, Waterbury, CT)
- ◆ **2nd** Electric Lion (SAE HEV Team, Penn State Univ.-State College)
- ◆ **3rd** Project e- (Project e- Team, Mount Everett High School, Sheffield, MA)

SAE Midwest Supermileage Single-Person Vehicles  
May 30-31 / Marshall, MI

Teams from more than 25 colleges and universities in North America met at Eaton Corporation's facilities east of Kalamazoo to participate in this event. The competition gives engineering and technology students the opportunity to design and build a small vehicle powered by a highly modified engine supplied by Briggs & Stratton.

- ◆ **1st** Technical Univ. of Nova Scotia "Privateer" (993 mpg)
- ◆ **2nd** Univ. de Sherbrooke "Sirius" (663 mpg)
- ◆ **3rd** Univ. of Massachusetts "The Dolphin" (612 mpg)

- ◆ **1st** Univ. of California-Davis
- ◆ **2nd** Virginia Tech
- ◆ **3rd** Univ. of Wisconsin-Madison

### SPECIAL AWARDS

#### **Most Energy-Efficient Vehicle**

- ◆ Univ. of California-Davis

#### **Best Over-the-Road Fuel Efficiency**

- ◆ Univ. of Wisconsin-Madison

#### **EPA Lowest Emissions**

- ◆ W. Virginia Univ. (one-half of ULEV)

#### **Best Use of Alternative Fuels**

- ◆ W. Virginia Univ.  
(compressed natural gas)

#### **Best Application of Advanced Technology**

- ◆ Univ. of California-Davis

#### **Best Application of Advanced Materials**

- ◆ Univ. of California-Davis

#### **Best Consumer Acceptability**

- ◆ Virginia Tech

#### **Best Technical Report**

- ◆ Univ. of California-Davis

#### **Best Quality and Execution**

- ◆ Univ. of Wisconsin-Madison

#### **Best Manufacturing and Cost Potential**

- ◆ Michigan Tech

#### **Faculty Award**

- ◆ Univ. of California-Davis



David Yetter, Philip Kunz, Jason Buege, Matthew Stoub, and Shannon Carey from St. John's Lutheran School, LaGrange, IL, took second place in the National Junior Solar Sprint.

### DOE STUDENT-BUILT VEHICLES

#### **Commuter Category**

- ◆ **1st** Sunico (Solar-Electric Car Team, New Hampshire Technical Inst., Concord, NH)
- ◆ **2nd** Sparky (Wooster's Charge, Wooster High School, Danbury, CT)
- ◆ **3rd** Electric Hare (The Wattsmen, Falmouth High School, Falmouth, ME)

FutureCar Challenge  
Mid-Sized Car Conversions  
June 3-11 / Detroit to Wash., DC

In the second year of this competition, sponsored by the U.S. Department of Energy (DOE) and the U.S. Council for Automotive Research, 12 student teams converted Chevrolet Lumina, Dodge Intrepids, or Ford Tauruses to run on one of several high-tech alternative power trains and fuels. (See article on p. 3.)

Sunrayce 97  
Solar-Powered Vehicles  
June 19-28 / Indianapolis to Colorado Springs

Thirty-six vehicles competed in Sunrayce 97, a biennial intercollegiate solar car race sponsored by DOE, General Motors (GM), and Electronic Data Systems (EDS). (See article on p. 1.)

- ◆ **1st** Cal. State Univ.-Los Angeles
- ◆ **2nd** Mass. Inst. of Technology
- ◆ **3rd** Stanford Univ./UC-Berkeley

(continued)

## COMPETITION RESULTS

(continued)

Electrathon  
Electric Vehicles  
July 14-16 / Marne, MI

Twenty electric vehicles competed in the 1997 Pentad National Electrathon at the Berlin Fair. Participants came from 18 schools; 16 entries were from Michigan. Overall scores were determined by adding together the laps from an oval track race and a road race. Four cars broke the previous record of 37.03 miles per charge set at the Seattle Marymoor Velodrome.

- ◆ 1st Lake Orion School, MI
- ◆ 2nd Lake Orion School, MI
- ◆ 3rd Holt High School, MI

National Junior Solar Sprint  
Model Solar-Powered Vehicles  
August 6 / Dallas, TX

The six fastest solar-powered cars from the 10 largest regional Junior Solar Sprints competed in the 1997 National Junior Solar Sprint on August 6 at The Science Place in Dallas, Texas. Sponsored by DOE and the K'NEX Corporation, the national competition involved sixth-, seventh-, and eighth-grade students. The national champion was Davidson Middle School in California, with a final time of 5.4 seconds. St. John's Lutheran School in LaGrange, Illinois, took second place, and Linwood Public School in New Hampshire placed third.

## COMPETITION CALENDAR

### 1998 EVENTS

May (dates TBD)

**Chicago Junior Solar Sprint**  
Middle School Competition  
Hinsdale, Illinois

- ◆ **Contact:**  
Christine McGhee  
Argonne National Laboratory  
Phone: (630) 252-8677

May 8-14

**10th Annual American Tour de Sol**  
Road Rally for Electrics  
New York City to Washington, DC

- ◆ **Contact:**  
Nancy Hazard  
Northeast Sustainable Energy Assoc.  
Phone: (413) 774-6051  
Fax: (413) 774-6053

May 25-June 1

**Ethanol Vehicle Challenge**  
Malibu Sedan Conversions  
GM facilities, Michigan,  
and Washington, DC

- ◆ **Contacts:**  
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U.S. Department of Energy  
Fax: (202) 586-1600  
E-mail: Shelley.Launey@ee.doe.gov

May 27-31

**Formula SAE**  
Formula-Style Racing Cars  
Pontiac, Michigan

- ◆ **Contacts:**  
Tony Androsky  
SAE International  
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Phone: (412) 772-8535  
E-mail: androsky@sae.org
- Shanin Hart  
SAE International  
Educational Relations Div.  
Phone: (412) 776-4841, ext. 7480  
E-mail: hart@sae.org

June 5-6

**Midwest Supermileage**  
Single-Person Vehicles  
Kalamazoo, Michigan

- ◆ **Contact:**  
Fred Kinney  
Eaton Corp., Transmission Div.  
Phone: (616) 342-3314

June 5-12

**FutureCar Challenge**  
Mid-sized Vehicle Conversions  
Chelsea, Michigan

- ◆ **Contact:**  
Shelley Launey  
U.S. Department of Energy  
Fax: (202) 586-1600  
E-mail: Shelley.Launey@ee.doe.gov

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Advancing Automotive Technology



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